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(54) Plastic cutting edge with cutting ribs

(57) A plastic cutting edge comprises a plastic web having a longitudinal dimension, a first major surface, and a second major surface opposite the first major surface. A plurality of separate, spaced apart, elongate cutting ribs are formed on at least one of the major surfaces of the web. The ribs are aligned longitudinally on the web and extend across the web. The plastic cutting edge is useful in conjunction with containers that include rolls of dispensable film, such as tape dispensers and cartons for aluminum foil or waxed paper.

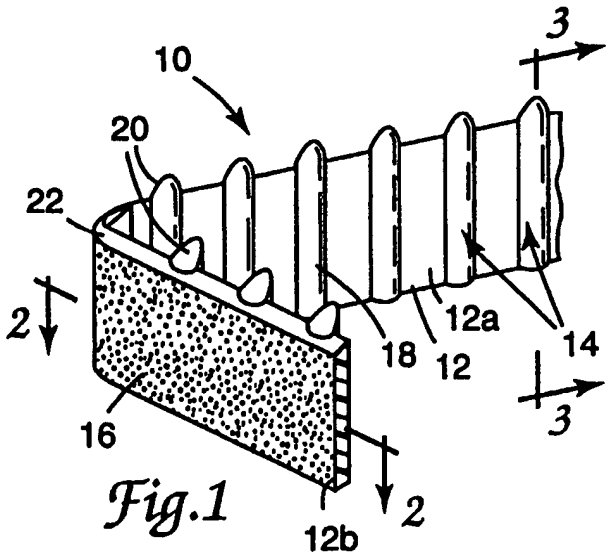

Fig.1

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to plastic cutting edges. More particularly, this invention relates to plastic cutting edges having cutting ribs and which are useful in conjunction with film dispensing containers, such as tape dispensers and cartons for aluminum foil or waxed paper.

Description of the Related Art

Cutting edges are commonly used in conjunction with film dispensing containers to sever the dispensed film into useable lengths. The container may be a carton containing a roll of film such as a roll of waxed paper, plastic food wrap or aluminum foil. The carton is typically provided with a serrated metal cutting edge for tearing off usable lengths of film. The container may also be a tape dispenser such as those used with transparent mending tapes found in homes and offices. These dispensers often include either a metal cutting edge that is separately attached to the dispenser or an integrally molded plastic cutting edge.

There is always a risk with these containers that someone using it may get cut by the sharp edge. Consequently, many food wrap containers include a warning to help prevent such an injury. Thus, a cutting edge that will reduce the likelihood of injury would be highly desired.

Some cutting edges can become dull with repeated use, thereby making it more difficult to easily sever film that is at the end of the roll. Sharpening the cutting edge is often impractical or even impossible if the cutting edge is permanently attached to the container. Thus, a cutting edge that can be easily replaced or that has a renewable cutting surface would be highly desired.

Increased concerns for the environment favor fully recyclable and/or repulpable packaging. However, metal blades can not be recycled with cardboard cartons or plastic containers.

Thus, there is a continuing need for an improved cutting edge that can be used with cartons that contain rolls of dispensable film, tape dispensers, and the like. The utility of the cutting edge will be enhanced if it possesses certain attributes. For example, it should have a low profile to reduce the risk of injury by being cut. It should be useful with a wide variety of paper, plastic and metal films. It should be capable of being replaced after it has been attached to a container; or removed, given a renewed cutting surface, and reattached to the container. It should be recyclable. Finally, the cutting edge should be easy to manufacture.

SUMMARY OF THE INVENTION

This invention relates to plastic cutting edges having cutting ribs and which are useful in conjunction with film dispensing containers, such as tape dispensers and cartons for aluminum foil or waxed paper. In one embodiment, the plastic cutting edges of the invention comprise a plastic web having first and second opposed major surfaces, and a plurality of separate, spaced apart, elongate plastic cutting ribs that are formed on at least one of (and optionally both of) the major surfaces of the web. Preferably, the ribs are substantially parallel to each other. The ribs are distributed (i.e., aligned) longitudinally on the web and extend across the web (i.e., transverse to the longitudinal direction of the web). The web also includes a longitudinally extending upper edge. The ribs can terminate adjacent to the longitudinally extending upper edge of the web so as to form the cutting surface. Alternatively, the ribs may comprise a root portion attached to the web and a beveled cutting tip (preferably at about 45°) that projects above the longitudinally extending upper edge of the web.

The cutting edge may further include a layer of adhesive (preferably a pressure sensitive adhesive) on one of the major surfaces of the web for attaching the cutting edge to a substrate. Other techniques for attaching the cutting edge to a substrate include mechanical fasteners and ultrasonic welding.

The cutting edge may be attached to a container that retains a roll of a dispensable film such that sections of the dispensable film can be cut from the roll. The cutting edges of the invention are particularly useful in conjunction with food wrap such as aluminum foil, waxed paper and clear plastic. Thus, in another embodiment, the invention relates to an elongated food wrap container that comprises an elongated carton having an open interior. An elongated roll of dispensable food wrap is retained within the interior of the carton, and a plastic cutting edge according to the invention is attached to the elongated carton for cutting sections of the dispensable food wrap from the roll. A preferred location for attaching the cutting edge is the inside surface of the front wall of the carton and adjacent to the upper edge of the front wall.

The cutting edges of the invention are also useful in conjunction with tape dispensers. Thus, in a further embodiment, the invention comprises a tape dispenser that includes a tape dispenser housing; a roll of dispensable tap

mounted to the tape dispenser housing, and a plastic cutting edge according to the invention for cutting th tape. The plastic cutting edge is attached to the tape dispenser housing.

The low profile, relatively flexible ribs provide a cutting surface that may reduce the likelihood of injury fr m use. By appropriate selection of an adhesive (e.g., by using a removable adhesive), the cutting edge may be removed and replaced with a new cutting edge, or the cutting edge can be given a renewed cutting surface and reattached. Because the cutting edge is formed of plastic, it may be readily recycled.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more fully appreciated with reference to the following non-limiting drawings in which similar reference numerals designate like or analogous components and in which:

FIG. 1 is a fragmentary perspective view of a plastic cutting edge according to the invention and which has been folded at an angle to show the invention more clearly;
FIG. 2 is an enlarged sectional view taken along lines 2--2 in FIG. 1;
FIG. 3 is an enlarged sectional view taken along lines 3--3 in FIG. 1;
FIG. 4 is a fragmentary top plan view of a different embodiment of a cutting edge according to the invention;
FIG. 5 is an enlarged sectional view similar to FIG. 3 and showing a further embodiment of the invention;
FIG. 6 is an enlarged sectional view similar to FIG. 2 and showing an alternative embodiment of a cutting edge according to the invention;
FIG. 7 is a perspective view of a container for use with a plastic cutting edge of the invention and containing a film roll, a portion of the film roll having been broken away to show the cutting edge more clearly;
FIG. 8 is a sectional view taken along lines 8--8 in FIG. 7;
FIG. 9 is an enlarged view of the area designated by the reference letter A in FIG. 8;
FIG. 10 is a sectional view similar to FIG. 8 but showing the cutting edge attached to the container in a different position; and
FIG. 11 is a perspective view of a tape dispenser for use in conjunction with a plastic cutting edge of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawings, a particularly preferred embodiment of a plastic cutting edge 10 according to the invention is illustrated in FIGS. 1 to 3. Cutting edge 10 comprises a web, backing or substrate 12 having a plurality of separate, spaced apart cutting ribs 14 formed on at least one of the web's first and second opposed major surfaces (i.e., surfaces 12a and 12b). Ribs 14 are distributed longitudinally on the web (i.e., they are aligned along the length of the web). Cutting edge 10 may also include an optional adhesive layer 16. As explained below, cutting edge 10 is useful for cutting dispensable films (especially consumer food wrap and adhesive tapes) into useable lengths.

The length of cutting edge 10 and web 12 depends on the application, the cutting edge and the web having a length that is generally equal to or somewhat greater than the width of the film that is to be cut. Cutting edge 10 is typically elongated; that is, it has a length greater than its width. However, the length and the width of the cutting edge may be equal. For food wrap applications, cutting edge 10 usually has a length of about 12 inches and a width of about 0.25 to 0.75 inch. For adhesive tape applications, cutting edge 10 usually has a length of about 0.125 to 6 inches and a width of about 0.25 to 1 inch.

Web 12 may be formed from a wide variety of polymeric materials, especially those which are extrudable, thermally stable thermoplastics such as, for example, polyesters (e.g., polyethylene terephthalate and copolymers based on polyethylene terephthalate), polyolefins (e.g., polyethylene and polypropylene), polystyrene, polycarbonate, nylon, acrylics, acrylonitrile-butadiene-styrene, cellulose esters, copolymers that comprise alternating units of ethylene and tetrafluoroethylene, and blends and copolymers of the foregoing materials. Preferably, web 12 (as well as cutting edge 10) is sufficiently flexible that it can wound into a roll. Typically, the web has a thickness of about 0.003 to 0.02 inch.

In preferred embodiments, ribs 14 comprise a root or proximal end 18 attached to web 12, and a distal end or cutting tip 20 that projects above adjacent longitudinally extending upper edge 22 of web 12. Ribs 14 are typically elongate structures that extend across web 12; that is, the ribs are transverse to the longitudinal axis of web 12. Ribs 14 usually form an angle of about 90° with the longitudinal axis of web 12, but may be oriented at a different angle, for example about 45° as shown in FIG. 4.

Ribs 14 may be formed from any polymeric material, preferably one which is an extrudable, thermally stable thermoplastic. Materials useful for forming web 12 may also be used to provide ribs 14. Preferably, the web and the ribs are formed of the same material, although this is not required. In addition, the polymeric material for web 12 and/or ribs 14 may be supplemented with various additives such as stabilizers, antioxidants, thixotropic agents, nucleating agents, flow control agents, colorants (e.g., titanium dioxide, carbon black), and fillers (e.g., calcium carbonate, abrasive grains, etc.).

As explained more fully h reinbelow, cutting edge 10 is readily formed by an extrusion process. Accordingly, the thickness, the diameter, and the cross-sectional shape and dimensions of ribs 14 are determined by the shape of the die orifice opening, the relative die angle, the position or location of the orifice openings, the extruder flow rate (mass of extrudate as a function of time), th rate of draw on the extrudate, the rate of quenching of th extruded material as it leaves the die orifice, the stretch ratio if the extrudate is oriented, and the calendaring pressure if the extrudate is calendared. These parameters are all well known to those of ordinary skill in the extrusion art.

Before any optional orientation of the extrudate, the ribs typically have a substantially circular cross-sectional shape or an omega (Ω) shaped cross-section, depending upon the configuration of the die orifice openings. However, the cross-sectional shape of the ribs is not so limited and other cross-sectional shapes are possible including squares, rectangles, triangles and bell shapes. If the extrudate is oriented (i.e., stretched) in the machine direction or calendared, the cross-sectional shape of the ribs often becomes distorted. For example, they may flatten or elongate.

The contact angles made by the ribs with respect to the major surface of the web to which they are attached (e.g., upper or first surface 12a in FIG. 1) may range from about 10° to 160°, more preferably from about 10° to 140°. At angles less than about 10°, it can become more difficult to manufacture the cutting edge with conventional extrusion equipment and commercially feasible operating speeds. The mass of ribs projecting above the rib-bearing surface of the web must be sufficient to provide an effective contact with the film that is to be cut by the cutting edge. That is, the effectiveness of the cutting edge may be reduced if an insufficient mass of ribs projects from the web.

Also as noted below, the ribs may be coextruded with the web (i.e., extruded at the same time) or extruded separately on to a hot or cold pre-formed web. Preferably, the ribs tend to fuse to the web and, upon doing so, a portion of the ribs flows into the spaces between each rib, thereby distorting the original cross-sectional shape (i.e., the shape immediately upon emerging from the extrusion die). Within these guidelines, at least 30%, more preferably at least 80%, of the original cross-sectional mass of the ribs project from the rib-bearing surface of the web.

Ribs 14 are spaced apart so as to provide an alternating series of ribs 14 and lands or flat portions 24 on upper web surface 12a (the surface of web 12 from which ribs 14 project). Typically, each rib is substantially identical to each other rib, and the rib-to-rib spacing is also substantially equal. The ribs are also substantially parallel to each other. By "substantially identical," "substantially equal," and "substantially parallel" it will be understood that minor differences in individual die orifice openings as well as orientation and calendaring of the extrudate can slightly alter the cross-sectional shape of any individual rib, its spacing from adjacent ribs, and its parallelism to adjacent ribs. Within these guidelines, and with reference to FIG. 2, the thickness "T" of ribs 14 is typically about 0.17 to 0.40 mm, the width "W" of the ribs is typically about 0.23 to 0.50 mm, and the rib-to-rib spacing "S" is usually about 0.50 to 0.75 mm.

The number of ribs per linear inch distributed longitudinally on web 12 will be influenced by the nature of the dispensable film that is to be cut by cutting edge 10 and the fineness of the cut that is desired. It is preferred that there be about 10 to 30 ribs per linear inch of web, most preferably about 25 ribs per linear inch so as to provide a nominal rib center-to-rib center spacing "C" of about 1 mm.

As mentioned above, each rib 14 preferably includes a distal end or cutting tip 20 that first contacts the film to be severed and initiates cutting of the film. The distance that cutting tips 20 is selected to project above adjacent longitudinally extending upper edge 22 of web 12 will be influenced by the stiffness of the cutting tip and the nature of the dispensable film that is to be cut. As best shown in FIG. 3, the height "H" of the cutting tip is typically about 0.14 to 0.25 mm in the most preferred embodiments. The height of the cutting tip is influenced by the angle "α" of the cutting tip which, as best shown in FIG. 3, is preferably less than 90°, more preferably about 30° to 60°, and most preferably about 45°. However, as shown in FIG. 5, the cutting tip may form a 90° angle, in which event rib 14 does not include a separate cutting tip that projects above adjacent longitudinally extending upper edge 22 of web 12. In FIG. 5, ribs 14 terminate adjacent to longitudinally extending upper edge 22 of the web. The cutting edge of FIG. 5 is useful with a film of limited extensibility such as aluminum foil.

Another embodiment of a cutting edge according to the invention is shown in FIG. 6. Cutting edge 30 comprises a web, backing or substrate 32 which may be formed of the same materials that can be used to provide web 12, a plurality of separated, spaced apart ribs 34 distributed longitudinally on the web and which are similar to ribs 14. Cutting edge 30 may also include an optional adhesive layer 36. The embodiment of FIG. 6 is similar to that shown in FIGS. 1 to 3 except that ribs 34 project from both major surfaces of web 32 (i.e., upper and lower surfaces 32a and 32b, respectively), rather than from only one major surface.

Cutting edges according to the invention are particularly useful for cutting a film into useable lengths. "Film" refers to materials that are substantially longer and wider than they are thick and is used broadly to include paper films, nonwoven films, plastic films and metals films. The films may be partially or completely coated on one or both surfaces so as to provide, for example, treated films, adhesive tapes, repositionable easel pad sheets and the like. Other uses include the cutting of pallet-wrapping films, facsimile transmission paper dispensed from a roll, and other sheet and roll goods.

One particularly preferred use for the cutting edges of the invention is shown in FIGS. 7 to 9 where the cutting edge is used in conjunction with a container or carton 40 that contains a film roll 42. Film roll 42 may be a roll of waxed paper, clear plastic food wrap, aluminum foil, and the like. Carton 40 is typically formed from a cardboard carton blank that is

folded and glued into the desired shape. More specifically, carton 40 is elongated and comprises an elongated bottom wall 44 to which are connected an elongated front wall 46, side walls 48 and 50, and an elongated rear wall 52 that are joined together to form carton 40 having an open interior portion in which film roll 42 is received. Film roll 42 is typically wound about a cardboard cor 54.

Carton 40 conventionally further includes a cover 56 that comprises a top wall 58 and a closure flap 60 at the forward edge of the top wall. Cover 56 is movable between an open position (as shown in FIGS. 7 and 8) and a closed position (not shown separately in the drawings) so as to enclose film roll 42 within carton 40, closure flap 60 being adjacent to the upper portion of front wall 46 in the closed position. Cover 56 is adapted for such movement by being hinged to the upper edge of rear wall 52, the hinge connection being shown at 62. Hinge connection 62 may be a continuous piano hinge, one or more individual mechanical hinges, or, most commonly, a crease or line of weakness formed in the cardboard carton.

A cutting edge according to the invention (which is illustrated in FIGS. 7 to 9 as cutting edge 10) is secured to any surface of carton 40 that permits a user to dispense film 42 and cut it into usable lengths by drawing the film against cutting ribs 14. Cutting edge 10 may be secured to carton 40 by any convenient attachment means such as ultrasonic welding, mechanical fasteners (e.g., staples, clips, pins, rivets), or adhesives. Adhesives are particularly preferred and any of a wide variety may be used to secure the cutting edge to the carton. Included among these are hot melt adhesives, solvent-coated adhesives, heat-activated adhesives, and solvent-activated adhesives. Pressure sensitive adhesives are most useful because they permit quick and easy attachment of the cutting edge to the carton. Representative examples of useful pressure sensitive adhesives include acrylate adhesives, tackified natural rubber adhesives, tackified block copolymer adhesives, poly alpha-olefin adhesives, silicone adhesives, and the like. The adhesive may be provided as a double sided adhesive tape. Removable adhesives may be useful in providing a cutting edge that can be replaced or renewed.

FIGS. 7 to 9 show cutting edge 10 secured to an upper edge 64 of inside surface 66 of front wall 46 such that cutting tips 20 project above longitudinally extending front wall upper edge 64 for easy engagement with film 42 as it is being dispensed. (The size of cutting tips 20 and their projection above edge 64 are exaggerated in FIGS. 8 and 9 to show the invention more clearly.) As shown in FIG. 10, the cutting edge may be attached to other surfaces of carton 40. For example, it may be secured to the outer surface of the edge of bottom wall 44 that is adjacent to front wall 46 such that cutting tips 20 project forward of the front wall. Although not shown separately in the drawings, the cutting edge may also be secured to inside surface 68 of closure flap 60 and adjacent to the free end thereof such that cutting tips 20 extend beyond the longitudinally extending free edge of the closure flap.

In another embodiment, as best shown in FIG. 11, a cutting edge according to the invention may be used in conjunction with a tape dispenser 70. Tape dispenser 70 comprises a housing 72 (typically formed of plastic) and a dispensable tape roll 74 rotatably mounted to the housing by a hub 76. A cutting edge (illustrated in FIG. 11 as cutting edge 10) is secured to curved front wall 78 of the housing by a mechanical, adhesive or other fastener or by providing a slot in the housing in which the cutting edge is received. The cutting edge may be removably attached to the tape dispenser housing. In any event, the cutting tips project above tape landing zone 80 such that when tape 74 is temporarily secured to the landing zone, a useable length thereof can be readily cut from the roll by drawing the tape against the cutting edge. Tape roll 74 may be transparent mending tape, masking tape, autoclave tape, correction/cover up tape, and the like.

Cutting edges according to the invention may be readily prepared by coextrusion techniques. For example, the cutting edge may be produced using a dual manifold die to which is connected a pair of separate extruders. The dual manifold die can include a slot orifice in the lower manifold for providing web 12 and a series of closely spaced orifices in the upper manifold for providing ribs 14. Raw materials, usually in the form of pellets, are melted by the extruders and delivered as two separate molten raw material streams to the dual manifold extrusion die. As the extrudates leave the dual manifold die in the molten state, they can be immediately combined to form a rib-bearing film. The output ratio of the web-forming extruder to the rib-forming extruder is typically in the range of about 1:1 to 8:1, based on the weight of the materials.

Alternatively, the extruders may provide their molten raw materials streams to a single combining manifold die, the molten raw material streams being joined and extruded through a single die orifice that comprises a plurality of notches for forming the ribs and an elongated slot for forming the web. In any event, once the rib-bearing film leaves the die (whether dual manifold or single combining manifold type), it is typically drawn onto a chilled casting roll, good contact with the casting roll being facilitated through the use of an air knife or electrostatic pinning. The rib-bearing film can be drawn through a nip formed by the chilled casting roll and a second casting roll that is run in the opposite direction.

The rib-bearing film, whether produced with a dual manifold die or single combining manifold die, may be oriented in the machine direction with a stretch ratio of up to 10:1. The rib-bearing film may also be calendared by passing the film through one or more nips between metal rolls to reduc the caliper of th film. Calendaring can have the effect of changing the rib shape, for example, from a circular shape to an elliptical or trapezoidal shape and can also help to reduce the stiffness of the film, thereby rendering it more pliable.

An optional adhesive layer (so as to provide adhesive layer 16 or 36) may be applied to the rib-bearing film using

techniques similar to those used to manufacture adhesive tape. The rib-bearing film can be treated (e.g., corona-treated, primed, etc.) so as to improve the adhesion of the adhesive to the film. Also, if desired, the adhesive layer may be protected from dirt and other contaminants by laminating a release liner (e.g., a silicone or wax-treated paper or plastic film) thereto. Alternatively, the rib-bearing surface of the film can be treated with a low adh sion backsize to permit the film to be wound into a roll. Techniques for manufacturing adhesive-coated, rib-bearing plastic films are described in more detail in U.S. Patent No. 5,173,141 (Leseman et al.).

At this point in the manufacturing process, it will be understood that the rib-bearing film comprises an essentially continuous web, sheet or membrane, and a plurality of separate, spaced apart, elongate ribs that extend in the machine or extrusion direction (i.e., parallel to the length of the essentially continuous film). Cutting edges according to the invention (usually in the form of narrow strips) are obtained from this rib-bearing film by slitting or cutting the same in the cross-film direction (typically perpendicular to the length of the film). In the resulting narrow strips, the elongate ribs are distributed longitudinally on the web (i.e., they are aligned along the length of the narrow strip web), but extend across the web (i.e., transverse to the longitudinal axis of the narrow strip web). Cutting tips 20 are formed by bevel cutting the rib-bearing film at the desired angle. Alternatively, the rib-bearing film can also be square cut (i.e., in a plane perpendicular to the plane of the film) so as to provide the embodiment shown in FIG. 5. The cutting edge may then be applied to a container such as carton 40 by laminating a cutting edge that includes an adhesive layer to the desired surface of the carton. Alternatively, a cutting edge that does not include an adhesive can be mechanically attached or ultrasonically welded.

A variety of continuous, integrated manufacturing approaches are also possible. For example, an incoming, essentially continuous rib-bearing film can be laminated to a carton blank (i.e., a flat piece of cardboard that has been cut for the carton but which has not yet been folded into shape) and then bevel cut in the cross-film direction so as to provide a cutting edge having beveled or angled cutting tips.

The invention will be more frilly appreciated with reference to the following non-limiting examples.

Examples 1 to 9

A series of plastic cutting edges with cutting ribs according to the invention was prepared by a coextrusion process using a dual manifold die. Both the ribs and the web were formed from virgin polypropylene resin (from FINA, Cosden Chemical Division).

More specifically, resin for the web was supplied by a 3.5 inch diameter extruder operating at 500° F and 47.5 revolutions per minute (RPM), while resin for the ribs was supplied by a 2 inch diameter extruder operating at 525° F and a rate specified in Table 1 below. The molten polypropylene resin streams from the two extruders were supplied to a dual manifold die. The upper die was 32 inches wide and included 25 rib-forming circular orifices per linear inch, the orifices being spaced 0.040 inch on center and having a diameter of about 0.013 inch. The lower, web-forming orifice, was a 35 inch wide, 0.025 inch high slot.

The ribs and web were combined upon exiting from the dual manifold die and were drawn from the die with the aid of a casting wheel maintained at a temperature of 110° F. The speed of the casting wheel is specified in Table 1 below. Several of the examples were oriented in the machine direction, as noted in Table 1 below, where the reported ratio is the orientation in the machine direction (MD) to the orientation in the cross-film direction (CD).

Examples 7 to 9 were calendared by passing the rib-bearing film between a pair of nip rollers. The thickness of the resulting film (web and ribs) was 0.0083 inch for example 7, 0.0071 inch for example 8, and 0.0066 inch for example 9.

The web surface not bearing ribs was corona-treated to at least 38 dynes/cm and was then coated with a tackified thermoplastic elastomer block copolymer hot melt pressure sensitive adhesive. A silicone release material-coated paper release liner was then laminated to the adhesive layer to protect the same.

The rib-bearing film was then trimmed to a 12 inch width and bevel cut with a matte cutter from the rib-bearing side of the film first so as to provide 45° cutting tips.

Table 1

Example	Rib-Forming Extruder Rate (RPM)	Casting Wheel Speed (feet/minute)	Orientation (MD:CD)
1	65	15.0	1.05:1
2	65	27.5	1.05:1
3	130	27.5	1.05:1
4	130	21.5	1.05:1
5	130	15.0	5:1
6	150	15.0	5:1
7	100	15.0	5:1
8	100	15.0	5:1
9	100	15.0	5:1

The ability of the cutting edges from examples 1 to 9 to cut waxed paper was tested. More specifically, an arrangement similar to that shown in FIGS. 7 and 8 was simulated by adhesively bonding a 12 inch long sample of the cutting edge to a piece of plain, flat cardboard. A piece of corrugated cardboard was then bonded to the surface of the flat cardboard carrying the cutting edge using double sided adhesive tape. The corrugated cardboard was positioned beneath the cutting edge and in abutment therewith. This assembly was then attached to the vertical edge of a table such that the flat top surface of the table simulated bottom wall 44 in FIGS. 7 and 8. WAXTEX brand waxed paper (from Menominee Paper Co., Menominee, MI) which unrolled from the bottom, was drawn against the cutting edge.

This arrangement was also used to test examples 1 to 3, 5, and 7 to 9 for their ability to cut aluminum foil (W41 brand from Packaging Corporation of America Northbrook, IL). The ability of the cutting edges from examples 4 and 6 to cut aluminum foil was evaluated by taking a box of the same brand of aluminum foil, removing the serrated metal cutting strip provided by the manufacturer, and replacing the same with a plastic cutting edge according to the invention. The resulting construction was the same as that shown in FIGS. 7 and 8.

Each of the nine examples was able to cut both waxed paper and aluminum foil.

The ability of an embodiment similar to that shown in FIG. 5 to cut waxed paper and aluminum foil was then evaluated. The rib-bearing films from examples 1 to 9 were trimmed to a 12 inch width and square cut from the rib-bearing side of the film to form a 90° angle as shown in FIG. 5. The resulting cutting edges were attached to boxes of waxed paper and aluminum foil (same brands as previously used) to provide a construction like that shown in FIGS. 7 and 8. Each of the nine examples was able to cut both waxed paper and aluminum foil, although the performance with aluminum foil was better.

Example 10

A plastic cutting edge according to the invention was prepared by taking the rib-bearing film from example 6 and diagonally square cutting the same. The resulting cutting edge had ribs oriented at a 45° angle with respect to the longitudinal axis of the web (as shown in FIG. 4), and the ribs terminated adjacent to the longitudinally extending upper edge of the web (as shown in FIG. 5, α=90°). The cutting edge was attached to a box of W41 brand aluminum foil, so as to have the configuration shown in FIG. 10. The cutting edge of example 10 was able to cut aluminum foil.

Examples 11 to 13

A series of three plastic cutting edges according to the invention was prepared using extrusion grade polycarbonate (from General Electric Company, Schenectady, NY) and a copolymer based on polyethylene terephthlate (EASTAR PETG copolyester 6763 from Eastman Chemical Company, Kingsport, TN) for the web and/or the ribs as specified below in Table 2 where "PC" is polycarbonate.

A 1.75 inch diameter extruder operating at 25 RPM was used to provide a molt n raw material stream for th web. The web extruder was maintained at 480° F for examples 11 and 13 and at 550° F for example 12. A 1.25 inch diamet r extruder operating at 37 RPM was used to provide a molten raw material stream for the ribs. The rib extruder was maintained at 550° F for examples 11 and 12 and at 480° F for example 13.

The two molten raw material steams were supplied to a dual manifold die. The upper di was 12 inches wide and included 14 rib-forming circular orifices per linear inch, the orifices being spaced 0.060 inch on center and having a diameter of about 0.020 inch. The lower, web-forming orifice, was a 12 inch wide, 0.020 inch high slot.

The ribs and web were combined upon exiting from the dual manifold die and were drawn from the die with the aid of a casting wheel running at 8 feet/minute and maintained at a temperature of 70° F. The examples were neither oriented nor calendared. The rib-bearing films were then diagonally bevel cut to have the configuration shown in FIG. 4 (ribs oriented at 45° with respect to the longitudinal axis of the web and with a 45° beveled cutting tip).

Using SCOTCH brand acrylic adhesive transfer tape #924-100 (from 3M Company, St. Paul, MN), the cutting edges were applied to different boxes of food wrap (W41 brand aluminum foil, WAXTEX brand waxed paper, and GLAD WRAP plastic wrap from First Brands Corporation, Danbury, CT) so as to have the configuration shown in FIG. 10. Example 12 cut the waxed paper and the aluminum foil. Examples 11 and 13 cut all three food wraps.

Table 2

Example	Web	Ribs
11	PETG	PC
12	PC	PC
13	PETG	PETG

The cutting edges of the invention offer many unique advantages. The low profile, relatively flexible (as compared to metal), cutting ribs provide a cutting surface that may reduce the likelihood of injury from use. By appropriate selection of a laminating adhesive (e.g., by using a removable adhesive), the cutting edge may be removed from an article to which it has been applied and replaced with a new cutting edge. Thus, a cutting edge that has become dull with use can be replaced. Alternatively, the cutting edge could be removed from the container and renewed by cutting the edge in the longitudinal direction with, for example, a conventional, single arm table top paper cutter. Because the cutting edge is formed of plastic, it may be readily recycled.

Various modifications and alterations of this invention will become apparent to those skilled in the art without departing from the scope and spirit of this invention, which is defined by the accompanying claims. It should be understood that this invention is not to be limited to the illustrative embodiments set forth herein.

Claims

1. A plastic cutting edge comprising:

   (a) a plastic web having a longitudinal dimension, a first major surface, and a second major surface opposite the first major surface, and
   (b) a plurality of separate, spaced apart, elongate plastic cutting ribs that are formed on at least one of the major surfaces of the web, wherein the ribs are aligned longitudinally on the web and extend across the web.

2. A plastic cutting edge comprising:

   (a) a plastic web having a longitudinal dimension, a first major surface, a second major surface opposite the first major surface, and a longitudinally extending upper edge, and
   (b) a plurality of separate, spaced apart, elongate plastic cutting ribs that are formed on at least one of the major surfaces of the web, wherein the ribs are aligned longitudinally on the web and extend across the web, and further wherein the ribs comprise a root portion attached to the web and a beveled cutting tip that projects above the longitudinally extending upper edge of the web.

3. A plastic cutting edge according to claim 1 or 2, wherein the web and the ribs are each formed of a thermoplastic.

4. A plastic cutting edge according to claim 3, wherein the web and the ribs are formed of the same thermoplastic.

5. A plastic cutting edg according to any one of claims 1 to 4, wherein the ribs ar substantially parallel to each other.

6. A plastic cutting edge according to any one of claims 1 to 5, wherein the web has a longitudinally extending upper edge and the ribs terminate adjacent to the longitudinally extending upper edge of the web to form the cutting sur-

face of the cutting edge.

7. A plastic cutting edge according to any one of claims 1 to 6, wherein the plurality of ribs are formed on only one of the first and second major surfaces of the web.

8. A plastic cutting edge according to any one of claims 1 to 7, wherein there are about 25 ribs per longitudinal inch of web.

9. A plastic cutting edge according to any one of claims 2 to 8, wherein the cutting tips are beveled at an angle about 45°.

10. A plastic cutting edge according to any one of claims 1 to 9, further comprising a layer of adhesive on one of the major surfaces of the web for attaching the cutting edge to a substrate.

11. An article comprising a container, a roll of dispensable film that is retained by the container, and a plastic cutting edge according to any one of claims 1 to 10 that is attached to the container for cutting sections of the dispensable film from the roll.

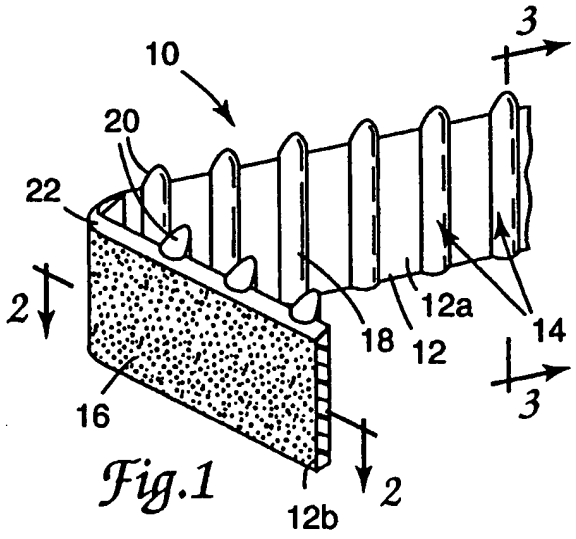

Fig.1

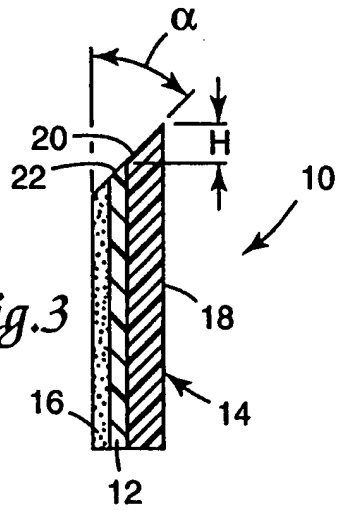

Fig.3

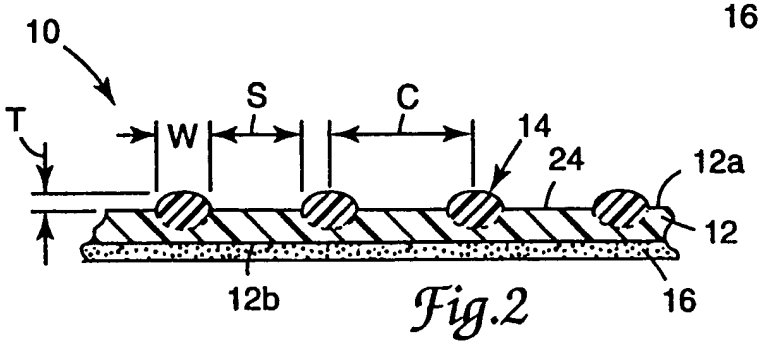

Fig.2

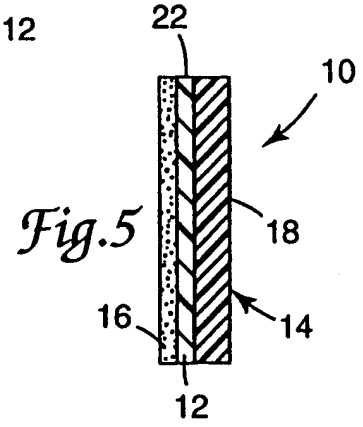

Fig.5

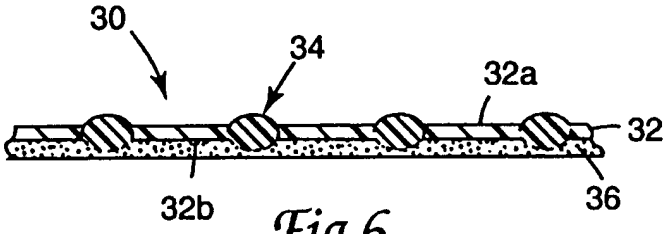

Fig.6

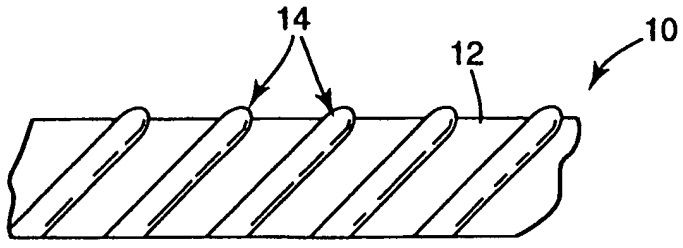

Fig.4

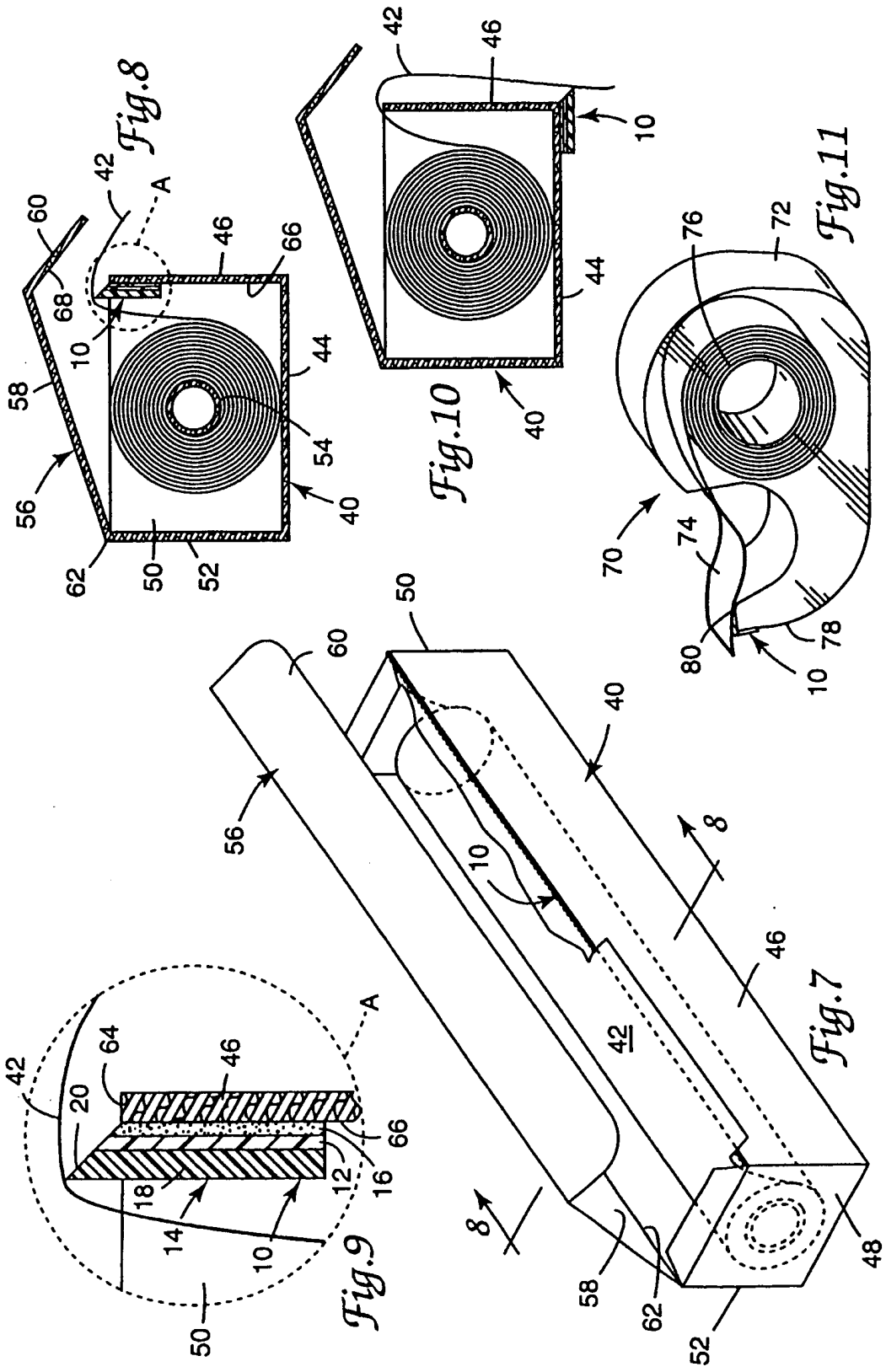
Fig.7
Fig.8
Fig.9
Fig.10
Fig.11
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